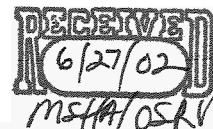




TVA Headquarters  
Whitegate Acre, Metherringham Fen, Lincoln, LN4 3AL, UK  
Tel: +44 1526 323990 Fax: +44 1526 323181

E-mail: [tva@vermiculite.org](mailto:tva@vermiculite.org)  
<http://www.vermiculite.org>

## FACSIMILE MESSAGE



Date:	27 June 2002
To:	MSHA Office of Standards, Regulations, and Variances
Fax No:	001 202 693 9441
From:	Dr. Michael J. Allen
Pages (inc. this one):	11
Our reference:	ANPRM - Measuring and Controlling Asbestos Exposure

Dear Sir

Herewith a copy of our revised submission made today by e-mail.

Yours faithfully

AB24-Comm-24



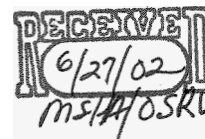
Headquarters  
Whitegale Acre, Metheringham Fen,  
Lincoln, LN4 3AL, UK  
Tel: +44 1526 323990  
Fax: +44 1526 323181

E-mail: [tva@vermiculite.org](mailto:tva@vermiculite.org)  
<http://www.vermiculite.org>

Our Ref: MJA/mc/T138  
Your Ref:

**MSHA**

Office of Standards, Regulations, and Variances  
1700 Wilson Boulevard, 23<sup>rd</sup> Floor  
Work Station 2352  
Arlington, VA 22209-2296  
USA



27 June 2002

Dear Sir

Further to our previous correspondence (Ref MJA/mc/T137) may we **make an** additional submission on the advanced notice of **proposed** rule **making** relating to measuring **and** controlling asbestos exposure.

Attached are our **comments** on the **MSHA** advance notice of **proposed** rulemaking. In particular **we** have addressed many of the **issues** raised in the ANPRM and have **given** comment **and** response to the related questions.

**We have** not **at** this stage given comment on Issue **5** - Impact, although some of our comments in answer to **the other issues** raised are relevant.

Yours faithfully

Dr. Michael J. Allen  
for The Vermiculite Association



**The Vermiculite Association**

*"Promoting the knowledge and use of Vermiculite around the world"*



Headquarters  
**Whitegate Acre**, Metherringham Fen,  
Lincoln, LN4 3AL, UK  
Tel: 444 1526 323990 Fax: +44 1526 323181

E-mail: [tva@vermiculite.org](mailto:tva@vermiculite.org)  
<http://www.vermiculite.org>

Our reference: **MJA/mc/T140**  
Your reference:

## Comments on the MSHA advance notice of proposed rulemaking.

Federal Register/ Vol **67**, No **61**/ Friday **March 29**, 2002/Proposed Rules

**John Addison, BSc F. Min. Soc.**

John Addison Consultancy  
**196 New Village Road**  
Cottingham  
HU16 4NL,  
United Kingdom

**Mr. N. Gumble,**

Virginia Vermiculite ,LLC,  
~~P.O. Box 70~~  
Louisa,  
Virginia 23093

**Dr. M. Allen,**

The Vermiculite Association  
**Whitegate Acre**  
**Metherringham** Fen  
Lincoln  
LN4 3AL  
United Kingdom

**Mr. E. Moeller,**

W.R. Grace & Co  
~~P.O. Box 687~~  
Inverness,  
CA 94937

**June 24<sup>th</sup> 2002**

**The Vermiculite Association**

*"Promoting the knowledge and use of Vermiculite around the world"*

## Comments on the MSHA advance notice of proposed rulemaking.

Mr. John Addison, Dr. M. Allen, Mr. N. Gumble, Mr. E. Moeller

### Introduction

These comments comprise the views of The Vermiculite Association. The Vermiculite Association is an organization of mining producers and exfoliators of vermiculite, and industrial users and commercial suppliers of products containing it.

The aims of the MSHA issues are:

1. to reduce the asbestos permissible exposure limits;
2. to revise the analytical methods for analyzing airborne fiber samples;
3. to introduce measures to reduce take-home asbestos contamination.

### Historical Perspective

To a large extent, the rulemaking proposed by MSHA stems from the tragic underestimation, by the companies involved and the regulatory agencies, of the risks posed by the asbestos in the vermiculite ore to the workers in the W.R. Grace vermiculite mine at Libby, Montana. It is important therefore to emphasize that the Libby vermiculite deposit is very unusual in containing large amounts of asbestos disseminated throughout the ore-body. This pervasive development of asbestos, to the extent that it is even found within the crystals of vermiculite and other minerals that comprise the rock, has not been seen in any of the other N. American deposits.

Atkinson (1982) reported amphibole asbestos contents of different production grades of Libby vermiculite in the range of 0.3 – 7 %. This average asbestos content is actually higher than in many asbestos mines. The sample of 'head feed' in that report may have been a grab sample that was not necessarily representative of general production but, with between 21 and 26 % asbestos content it may indicate that extremely high levels of asbestos are sometimes present. In view of these amounts of asbestos it is not surprising that measurements and NIOSH estimates of airborne fiber concentrations were extremely high (up to 182 fm<sup>l</sup><sup>-1</sup>) in a wide range of occupational settings for periods before 1964 and up to 1971 (Amandus 1988).

Airborne fiber concentrations in the later years of operation were progressively lower as wet processing of the ore was introduced and as dust control practices were improved. Even so, exposure between 1971 and 1982 were only reported as 'less than 1 f/cc' and by 1984, not long before closure of the mine as 'less than 0.1 f/cc'.

The situation in Libby contrasts markedly with those at other vermiculite mines. Amphibole asbestos may be found in some of these mines, but not within the vermiculite ore itself. Asbestos occurs in occasional thin veins, and along shear planes at the margins of later intrusive igneous rock. Quantitative estimates of the asbestos contents are difficult because of the nature of the geology of the mines but the amount is probably less than in the Libby mine by several orders of magnitude (probably a fraction of 0.1%). It is generally avoided during mining of the ore, and the resulting product frequently contains no detectable asbestos using UK MDHS method that has a sensitivity stated as better than 1 part per million. Atkinson (1988) reported transmission electron microscope analyses of vermiculites from S. Carolina with asbestos contents between 22 ppm and 0.49 ppm (depending on which Laboratory was used) for the head feed at Enoree, and less than 0.3 ppm for un-graded ore at Patterson. McDonald et al (1988) showed average airborne fiber concentrations at Enoree to be around  $0.09 \text{ fml}^{-1}$  as measured by TEM; only half of the fibers were identified as asbestos. At the same time, phase contrast microscope fiber concentrations for 122 samples out of 140 were less than 0.007 f/cc while the remainder had an average concentration of 0.031 f/cc.

One important feature of many vermiculite deposits is the presence of high proportions of amphibole minerals in the rock that constitutes the ore. These minerals are noted for their property of cleavage, a tendency for the crystals to split along systematic sets of fracture planes. This means that when crushed they tend to form elongate fragments. These are generally neither as fine nor as long as asbestos fibers but some are nevertheless within the size criteria for regulatory fibers that are required to be counted in phase contrast fiber counting methods. They are not asbestos and OSHA has stated that evidence is lacking to conclude that non-asbestiform tremolite, anthophyllite and actinolite present the same type or magnitude of health effect as asbestos, and that the failure to regulate them as asbestos does

not present a significant **risk** to employees (Federal Register, 1994). Most of the 'fibers' counted in the MSHA compliance testing of currently operating vermiculite mines in N. America have been found by TEM analysis to be amphibole cleavage fragment fibers (Reference report on Virginia Vermiculite samples taken **by MSHA** in August 2000 and analyzed for MSHA **by R.J. Lee Inc**). When counting was carried out by **skilled analysts** (OSHA Salt Lake City) using their best opinions to discriminate between cleavage fragment fibers and true asbestos the MSHA compliance testing of **all vermiculite mines** (except Libby) consistently produced fiber counts that were below the detection limit of the method (<0.01 f/cc).

### **Issue 1. Reducing the PEL.**

The Vermiculite Association supports the proposal to reduce **the** PEL for asbestos to the OSHA level of 0.1 f/cc, provided that proper provision is made in the **measuring** procedures to exclude non-asbestos fibers from the count.

Question a. *What **exposure limit** would provide the appropriate **level of protection** to exposed miners? Would adopting the OSHA limits afford sufficient protection to miners?*

It is generally accepted that there is a cumulative fiber exposure threshold for asbestosis. Whether that threshold is 30 f ml.yrs (e.g. cumulative **exposure** for 30 years at 1 fiber per milliliter) or 50 f ml.yrs, as different experts have suggested, the OSHA PEL should provide sufficient protection. **As far** as lung cancer or mesothelioma is concerned the issue is more complicated. OSHA accepts that risks of these still persist for cumulative exposures over working lifetimes **at the** PEL. The balance that is inherent in any PEL between tolerable risk and other socio-economic factors is not a subject for The Vermiculite Association to debate at this time.

Question b. *MSHA's recent field sampling data show that none of the samples collected exceed the OSHA's 8 hour time **weighted average** of 0.1 f/cc **when** analyzed using the TEM method. **Considering** the low fiber levels observed, what would be an appropriate agency action?*

The answer to question b lies within the data collected by **MSHA**. The PCM fiber counts were consistently higher than the TEM fiber counts on the ~~same~~ samples. The PCM fiber counts would in **all** cases have given a health risk conservative result, at significantly lower cost than the TEM result. TEM analysis **should** only then be necessary in cases where PCM counts exceeded ~~an~~ action level.

## **Issue 2. Analytical Method.**

MSHA is considering the option of using Transmission Electron Microscopy to analyze fiber samples that may contain asbestos. There are many difficulties associated with recommending this option as is clear from **the** subsidiary questions in the ANPRM.

The most important question **is** not asked by MSHA. That is at what level of asbestos presence in a **rock** or an ore will a decision **be** made that it is likely to constitute a risk that must be measured by TEM? **As** MSHA will already be aware, asbestos is a ubiquitous substance that is present in the ambient atmosphere of the planet **and** may be present in trace amounts in almost any sizeable mine or quarry with igneous or metamorphic rock. Imposition of TEM analysis on those with trace amounts would place an unnecessary burden upon them with no significant benefit to the workers. The asbestos content limit in the **OSHA** definition of an asbestos containing material **is** 1% asbestos. Imposing TEM analysis only on mines or quarries with this amount or **more** would allow situations that *are* almost as bad as Libby to continue. Some judgement should be made as to what constitutes a significant **risk** in terms of the asbestos proportions in the rock.

---

Question c. *What is the advantage for MSHA to use TEM to initially analyze airborne fibers collected on all filters?*

There is no advantage to **MSHA** to use TEM to initially analyze airborne fibers collected on all filters. A large number of these will contain no asbestos fibers, or asbestos fibers at a concentration below the detection limit of the method. In addition, other mineral dust will almost certainly prevent the collection of analyzable samples or constrain the sample volume to such a low level that detection limits will be too high to be of any value.

Question d. *What is the availability and cost of commercial TEM analysis services?*

The availability of TEM laboratories is not the main issue. The main issue is whether the laboratories are competent and have sufficient expertise to make the necessary distinctions between asbestos minerals and cleavage fragment fibers. Those that have the skills are likely to be more expensive than those set up to capitalize on a significant opportunity but without the staff with sufficient training or expertise to carry out the analysis to a suitable standard. It is almost certain that a suitably trained analytical workforce does not exist at present, Nor are the issues of definition and identification of asbestos fibers in the TEM method properly understood or resolved.

Question e. *Should we measure PEL compliance using TEM?*

The use of PCM for compliance monitoring stems from its use in the epidemiology studies upon which the PEL was based; as such it is still the best index of the risk to health that may be present in a workplace atmosphere provided that discrimination of asbestos from other fibers can be correctly done. It is the opinion of The Vermiculite Association that this was being done by MSHA through the OSHA laboratory in Salt Lake City in their analyses of membrane filter samples from vermiculite mines over the last ten years or so.

Until a direct relationship has been established between TEM analyses and PCM analyses there is no justification in assessing compliance with the PEL by TEM analysis. Furthermore, the NIOSH TEM method of counting PCM equivalent fibers on the basis of a fiber diameter that would be visible if the sample had been examined by PCM is open to some question as to what truly is the diameter cut-off for PCM visibility. There has not been sufficient testing of this method to warrant the use of the method for compliance testing.

Question f. *Are there studies which correlate asbestos exposure determined by TEM with incidence of asbestos disease?*

There are no epidemiology studies of human subjects where the exposures have been adequately described by TEM analysis to correlate asbestos exposure as measured by TEM



with the incidence of disease. TEM **fiber** data from animal studies are not adequate for this judgement to be made.

Question g. *Are there data comparing PCM to TEM fiber counts from the same filter for the mine environment?*

MSHA has already collected a certain amount of data from the vermiculite mines (other than Libby) to show that the correlation between PCM fiber counts and TEM asbestos fiber counts on **the same** filter is poor. In the mining and other mixed dust situations, NIOSH methods that do not discriminate asbestos fibers from mineral fragments have consistently overestimated **asbestos** exposure.

Question h. *What method is most appropriate for MSHA to use (e.g., EPA, ASTM, OSHA, or NIOSH) to analyze bulk samples for asbestos in the mining industry?*

The available regulatory methods are not validated for quantitative analysis of bulk samples to levels below 1%. **As** a consequence none of them provide a suitable basis upon which to base an estimate of possible risks at a level where those risks **are** not significant. One percent asbestos by mass is likely to produce a **very** significant health **risk** if a dust cloud is generated from it in a working environment. **Any** method that is required to detect a risk to health from small amounts of asbestos in bulk materials should have a detection limit, or limit of quantification, considerably below the 1% level. At the same time the method must recognize the differences between normal amphibole minerals and their asbestos analogues. If no such method exists in the **US** then one should be developed **as** a matter of urgent priority, using proper scientific protocol and peer review testing tied to sound **risk** analysis.

---

### **Issue 3. Take - Home contamination,**

As with the issues of TEM analysis, the **main** question to be addressed here **is** not mentioned. At what point **are any** regulations regarding workplace preventive measures, education, training etc. to be imposed upon a mine or quarry that contains **m y** detectable asbestos? How is that asbestos to **be** defined, identified or quantified? Unless provisions are made very carefully with proper consideration of the definitions of asbestos, recognizing the differences

between non-asbestos amphiboles and their asbestos **analogues**, and accepting the presence of other fibrous minerals and mineral fragment, then the consequences for industry may be very severe and with no direct benefit to the workers.

#### **Issue 4. Sampling and Awareness of Asbestos Hazards.**

Question n. *How can mineral dust interference be most accurately removed from the samples?*

Some progress **has** been made in the development of dust sampling instruments. It is feasible to use a cyclone selector **prior** to filtration as a means of separating out the respirable fraction from the airborne dust. Since **the** overwhelming majority of the asbestos hazard is found in this fraction it *is* possible that this procedure would enhance detection and analysis of asbestos in the atmosphere. If, as has been suggested, the predominant part of the risk is confined to asbestos fibers that **are** thinner than 0.5 microns in diameter, ~~then~~ appropriate use of a cyclone separator may enhance the analysis of the filters **very** significantly.

Question o. *Does our current field sampling meet the needs of the mining community?*

The current field sampling methods **are** adequate for the majority of mines **and** quarries within the USA. When no significant asbestos **is** found in a given mine or **quarry** then current field sampling methods are certainly adequate.

Question p. *How should mine operators ensure that miners are aware of potential asbestos hazards at the mine site **and** provide adequate protection?*

There is a need for a balanced and rational explanation **of** the hazards of asbestos throughout the mining industry. There should be a broad reassurance of the workforce and the general public that, for the majority of the mining **and** quarrying industry there is no significant health risk from asbestos minerals above that which is **presented by** the ambient atmosphere from natural processes.

**Overview.**

The vermiculite industry in the **USA** is a responsible group of companies that has attempted at **all** times to comply **with what has** been required of it by the regulatory agencies. The tragic situation in Libby, Montana in no way represents the current situation for vermiculite producers today. The Vermiculite Association is doing everything it can to encourage higher standards within the industry **and** is in the **process** of trying to establish industry-wide standards that are acceptable to users and consumers alike while **at** the same time maintaining a viable industry. Sections of the **media** have **wrongly** asserted that the Libby tragedy exemplifies the whole vermiculite industry, others have wrongly stated that vermiculite itself is asbestos (vermiculite is NOT asbestos). In the face of this **pressure** the vermiculite industry in the USA is **under** a serious threat and in order to survive it needs to have a regulatory framework that is rational and responsive not only to the need to protect workers but also fair to the industry.

The Vermiculite Association **supports the** reduction of the PEL to the 0.1 f/cc standard provided that **MSHA** is mindful of the need to apply this standard to asbestos alone, and to workplace situations where it is genuinely warranted.